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California's capital hosts NASA anniversary celebration and exhibit

California's diverse landforms are highlighted in this three-dimensional image taken by the Shuttle Radar Topography Mission during its 11-day flight aboard Space Shuttle Endeavour in February 2000.

the G A R T H

California As Seen From Space

"California As Seen From Space," a collection of breathtaking imagery as seen through the eyes of JPL missions and instruments, highlights a free public exhibit commemorating 40 years of planetary exploration on display at California's State Capital in Sacramento.

The California images illustrate some of the ways spacebased imaging is being

applied to improving life on Earth, such as creating topographic maps, conducting climate and land surface studies and monitoring dynamic conditions. The images were obtained from the Shuttle Radar Topography Mission, Spaceborne Imaging Radar-C/X-band Synthetic Aperture Radar, and the Multi-angle Imaging SpectroRadiometer and Advanced Spaceborne Thermal Emission and Reflection Radiometer on NASA's Terra spacecraft.

The overall exhibit, entitled "Journey to the Planets and Beyond," showcases JPL's work in Earth science, solar system and universe exploration and technology development. Special displays commemorate the 40th anniversary of the Aug. 27, 1962 launch of NASA's Venus probe Mariner 2 — the first successful interplanetary spacecraft — and the 25th anniversary of the launch of the Voyager 1 (Aug. 20, 1977) and Voyager 2 (Sept. 5, 1977) spacecraft to our solar system's outer planets.

At a reception for state legislators and other invited guests at the Capital, JPL Director Dr. Charles Elachi said the accomplishments of Mariner 2, Voyager and other JPL-managed planetary missions laid the groundwork for many of today's missions to study Earth that have benefited Californians.

Stardust reaches for cosmic dust

On a mission to collect and return the first samples from a comet, on Aug. 5 Stardust began to collect tiny specks of solid matter, called interstellar dust grains, that permeate the galaxy.

"If you look at the Milky Way on a dark night you may see a black band stretching along the center. The band is interstellar dust blocking the light from distant stars. These are the particles that Stardust will be collecting," said Dr. Don Brownlee, an astronomy professor at the University of Washington, Seattle, and the principal investigator of the Stardust mission.

This dust, passing through the solar system like a wind, is made of particles smaller than one-hundredth the width of a human hair. The particles are made of varying amounts of most of the elements in the periodic table. The Stardust mission will use its special formulation of aerogel, the world's lightest solid, to try to capture these small solid particles as the spacecraft travels in the same direction as the dust stream until Dec. 9, 2002.

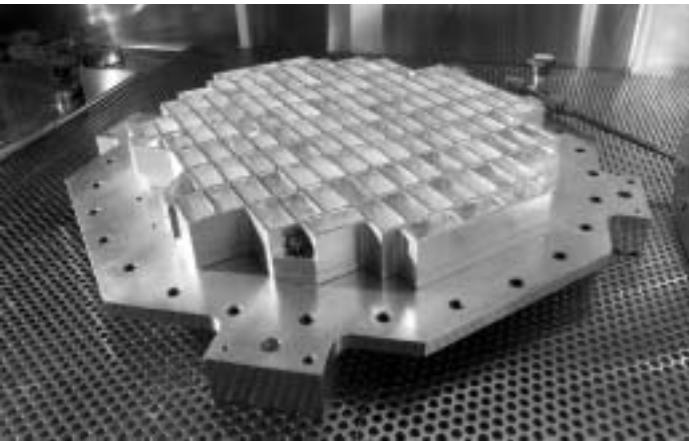
"Stardust's tennis-racket-shaped particle collector has shoulder and wrist joints that will point one side of the aerogel collector material into the dust stream to collect interstellar dust," said Tom Duxbury, the project's manager. "When Stardust encounters comet Wild 2 in early 2004, the reverse side of the collector will trap particles from the gas and dust escaping from the inside of the comet. When the dust samples return to Earth in 2006, we will extract and analyze the particles."

The Stardust mission collects both ancient and young dust. Comets are made of interstellar particles that clumped together with ices more than 4.5 billion years ago. When the spacecraft flies past comet Wild 2, it will attempt to collect ancient dust samples stored for billions of years in, effectively, a deep freeze.

On Aug. 5, the mission began collecting a younger type of stardust: the free-flowing interstellar dust that was produced by the current gen-

eration of stars. Comparing the ancient and newer types of dust may provide clues to the evolutionary changes in the galaxy and the composition of the early galaxy. This is the second and final time Stardust will collect these dust particles. It previously collected samples during a six-week period in 2000.

Comet Wild 2 is a particularly good example of preserved interstellar dust because its path through space brings it no closer to the Sun than Mars' orbit, about 228 million kilometers (about 141 million



Stardust's aerogel collector

miles) from the Sun. Before 1974, the closest Wild 2 came to the Sun was Jupiter, Brownlee said.

Galileo and Ulysses spacecraft both detected a stream of dust particles flowing between stars and into the solar system. The particles did not come from the Sun, but from another direction that showed their origin was outside the solar system.

Interstellar dust may have played a role in bringing the building blocks of life -- carbon and other organic materials -- to the young Earth. Similarly, comet impacts may have also brought these elements to Earth. Brownlee expects to find a lot of carbon in the interstellar dust particles. "When Earth-like planets form, comets and interstellar grains may bring carbon and organic material," he said.

The interstellar dust stream differs from the solar wind in that the solar wind is made of individual atoms, while the interstellar dust is made of small particles of rocks with complex compositions.

More information on the Stardust mission is available at <http://stardust.jpl.nasa.gov>.

Mariner 2, a quarter of a century after launch

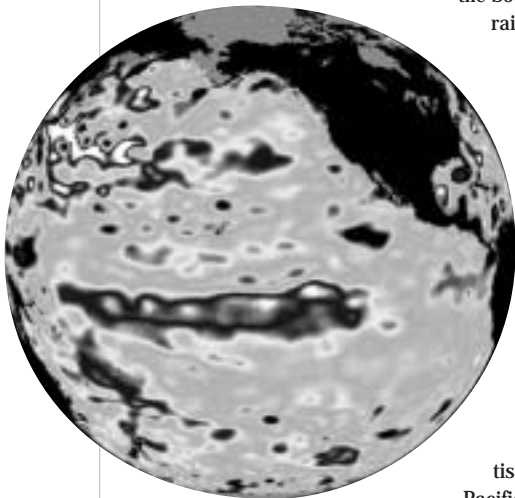
Mariner 2, the first spacecraft to fly by another planet, successfully launched on a mission to Venus on August 27, 1962. It flew by Earth's neighbor in December of that year.



News Briefs

Eyes on a possible “mild” El Nino

This Topex/Poseidon image of sea-surface heights was taken during a 10-day collection cycle ending August 7, 2002. Sea-surface heights are a measure of how much heat is stored in the ocean below to influence future planetary climate events. Since May 2001, there have been a series of warm Kelvin waves--eastward-moving ocean waves that cross the equatorial Pacific in about two months. A sizable one arrived at the South American coast last February, raising the ocean temperature by 2 degrees Celsius (3.6 degrees Fahrenheit) and triggering the National Oceanic and Atmospheric Administration's forecast for a mild El Nino in 2002. There was another wave in June, followed by the current large pool of warm water in the tropical Pacific that is now moving toward the coast of South America at a speed of 215 kilometers (134 miles) a day and will arrive there in three to four weeks, raising ocean temperatures. Scientists will continue to monitor the Pacific closely for further signs of El Niño formation and intensity.



Groundbreaking for the new Flight Hardware Logistic Program's home

Ground was broken in late July on a new facility that will support JPL's Flight Hardware Logistics Program (FHLP) as well as electromagnetic compatibility testing. The FHLP's current Bonded Stores provides a centralized facility to more efficiently transfer residual flight hardware from past to future projects. Due to the increase in projects, the amount of residual flight hardware is increasing and, there is a greater possibility of and need for reutilization, according to Ken Van Amringe, FHLP residual inventory project element manager. To be located between Buildings 148 and 248, the new FHLP Bonded Stores facility (Building 325) will have more than 4,000 square feet to receive post-launch residual

ues to be the prime home of the Office 513 Electromagnetic Compatibility test lab. “For many years there has been a need to test larger items than can be accommodated in the Building 179 area; Building 325 finally meets that need,” said Albert Whittlesey, EMC test lead. “For the past three years, the modular demountable shield room has been located in the Building 144 dynamic lab and more recently in the 179 high bay. Both those areas, however, have only been temporary homes to the shield room. Building 325 will provide a permanent home, permitting electromagnetic compatibility testing of larger hardware elements such as High Energy Solar Spectroscopic Imager, Microwave Limb Sounder, and Thermal Emission Spectrometer, and also complete spacecraft such as Cloud-Sat.”

In the past 18 months, FHLP has collected more than 6,000 residual hardware items from projects, most of which have launched and no longer need the hardware for their mission, said Van Amringe, who valued the hardware at \$123 million. During that time, he said, the program has delivered more than 500 items from its inventory to new or current

hardware for staging, review, disposition, storage, and inventory management. The facility will include a 300-square-foot Class 100,000 clean room for hardware review required by projects. A portion of the new building—a pre-fabricated structure due to be delivered in September and operational in October—will be dedicated to an Electromagnetic Compatibility Shield Room facility. The radio frequency shield room will supplement the smaller Electromagnetic Compatibility facility now in Building 179, which contin-

projects, subcontractors or university partners. To help JPL achieve its goal to provide critical hardware to projects faster and more efficiently, the FHLP also brokers common flight procurements, develops anticipatory buys and supplier agreements, and provides information to projects and proposers about flight hardware availability and information. FHLP's on-line website and catalog at <http://fhlp> provides Lab-wide access to the FHLP inventory and other inventories on Lab.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meetings are available. Call the Employee Assistance Program at ext. 4-3680 for time and location.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Group—Meets the first and third Fridays of the month at noon in Building 111-117. Call the Employee Assistance Program at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Kármán Auditorium and Friday in the Vosloh Forum at Pasadena City College 1570 East Colorado Blvd. Both lectures begin at 7 p.m. For more information, log on to <http://www.jpl.nasa.gov/events/lectures/aug02.html> or call Public Services at ext. 4-0112.

Wednesday, August 28

JPL Toastmasters Club—Meeting at 5 p.m. in the 167 conference room. Call Roger Carlson at ext. 4-2295 for information.

JPL Gun Club—Meeting at noon in Building 183-328.

Friday, August 16

TIAA/CREF Enrollment—This monthly meeting is designed to assist employees who are newly eligible for Caltech/JPL Retirement Plan participation in selecting investment options and completing enrollment forms. To be held at noon in T1720-137.

Tuesday, August 20

Investment Advice—One-on-one counseling appointments are available with Fidelity. For an appointment, call (800) 642-7131.

Thursday, August 22

JPL Story—"The True Story Behind the Mars Pathfinder Success," presented by Rob Manning, flight system chief engineer, Brian Muirhead, flight system manager, and Richard Cook, mission manager. from 4-5 p.m., in the Library, west end of building 111.

Thu.-Fri., August 22-23

Von Kármán Lecture Series—Blaine Baggett, executive manager of JPL's Office of Communications and Education, will present "Journey to the Planets and Beyond: Space Exploration and the Visual Arts" Thursday in von



Thursday, August 29

JPL Golf Club—Meeting at noon in Building 306-302.

Thu. - Fri., September 5-6

IEEE/JPL Descanso sponsors a two-day workshop on wireless communications and networking in Pasadena. The meeting's emphasis is on power efficient wireless ad hoc networks. Dr. Charles Elachi, JPL Director and general chair of the workshop, will open the meeting with welcome and opening remarks. The agenda includes keynote speakers, Dr. Andrew Viterbi, Qualcomm co-founder, and Prof. Deborah Estrin, UCLA; a panel discussion featuring industrial panelists; education outreach opportunity for local universities. Participants include Caltech, UCLA and USC. The full program and registration details can be viewed at <http://dsp.jpl.nasa.gov/cas/Organizers>. Fees are \$250 for IEEE members, \$300 for non-members, and \$125 for students. For more information, contact: Marvin Simon 4-3955 or Tsun-Yee Yan, 4-3016,

Ongoing

JPL Tennis Club—A round robin is held Saturdays at 9 a.m. at El Molino School Tennis Courts, at the corner of Del Mar Boulevard and El Molino Street. Parking is available. For information, call Gordon Blackhall, ext. 4-6981 or Jorge Vazquez, 4-6980.

ISO has improved life at the lab

Many of JPL's work processes have improved as a result of ISO 9001 implementation. Benefits received from improving the way we identify and resolve process problems range from improved mission success to the avoidance of dangerous situations.

The Corrective Action Tool is available online

ISO 9001 requires that JPL investigate and implement improvements to eliminate the causes of problems. To comply, JPL has created a web tool where problems are tracked. Once identified, a written notice is entered into the JPL "Corrective / Preventive Action Tools" website at <https://problemreporting/cpa.htm> and is followed to solution. These notices are either a Corrective Action Notice (CAN) or a Preventive Action Notice (PAN). A CAN addresses a problem that has already occurred and a PAN addresses the potential for a problem that could occur.

Anyone can issue JPL corrective and preventative actions

The majority of CANs are opened as the result of an internal assessment or external audit. However, anyone can open a CAN or PAN at the web site.

How CANs and PANs have benefited JPL

One example is the promptness with which we responded to the Mars Failures using the corrective action methodology. It allowed us to address and deal with the failures quickly and improve our mission success as evidenced by the superb navigation of Mars Odyssey.

Another CAN resulted in a vast improvement in how we handle calibrated equipment. Precipitated by an ISO audit corrective action finding, this CAN allowed us to remove unnecessary requirements that had been placed on scientists and researchers. Instead, it now focuses on requirements for calibrated equipment on flight projects. The new learning management system and improved ECAP process are also results of CANs.

In addition, a PAN initiated by Willis Chapman, Division Manager of Logistics and Technical Information, looked at how JPL received unscheduled explosive material deliveries. He noted that there was no common link between logistics, procurement and security and one was put into place. Now we know how to handle hazardous materials that arrive unscheduled, avoiding potentially dangerous situations.

For more information about ISO, contact the ISO representative in your organization, listed at <http://iso/help/list-orgreps.html>.

Photo by Dutch Slager / JPL Photolab



From left: Joe Solomon, Facilities Project Manager; Kevin Clark, FHLP Program Manager; Tom Gavin, Associate Director Flight Projects; Al Whittlesey, EMC Testing Manager; Jeff Leising, Project Planning Office; and Ron Ploszaj, Project Support Office.

A quarter-century after NASA's twin Voyager spacecraft departed Earth to visit outer planets, the historic mission is flying a race against time.

DURING THE FIRST 12 YEARS AFTER LAUNCH in 1977, the Voyagers chalked up a wealth of discoveries about four planets and 48 moons, including fast winds on Neptune, kinks in Saturn's rings and volcanoes on Jupiter's moon Io. As scientists and engineers mark the mission's silver anniversary, they hope at least one Voyager will pass beyond the boundary of the Sun's influence before the onboard nuclear power supply wanes too low to tell us what's out there. Voyager 1 is now the most distant human-made object, about 85 times as far from the Sun as Earth is. Voyager 2 is now about 68 times the Sun-Earth distance.

"After 25 years, the spacecraft are still going strong," said Dr. Edward Stone, Voyager project scientist since 1972 and former JPL director. "Back in 1977, we had no way to know they would last so long. We were initially just on a four-year journey to Jupiter and Saturn."

The Voyager team at JPL still receives information almost daily from the durable spacecraft traveling beyond all the planets. The Voyagers are examining the far reaches of the solar wind, a gusty flow of particles hurled outward by the Sun. The eventual goal is to become the first spacecraft to taste interstellar space.

Voyager 1, which launched on Sept. 5, 1977, flew past Jupiter and Saturn, then angled northward out of the plane of the planets' orbits. After Voyager 2 launched on Aug. 20, 1977, and completed its tour of Jupiter and Saturn, NASA extended its adventure with flybys of Uranus in 1986 and Neptune in 1989.

"A radio signal traveling at the speed of light takes nearly 12 hours to travel between Voyager 1 and Earth. That raises operational concerns," said Ed Massey, Voyager's project manager at JPL. "If something went wrong on board, at least a full day would lapse before a signal revealing the problem could reach Earth and commands to fix it could be returned. It could be too late." So the project team tries to anticipate any emergencies and program the spacecraft's computers with advance instructions on how to react to them, he said.

Both spacecraft are studying the vast bubble the Sun inflates around itself by outward pressure of the solar wind. The bubble has a boundary, called the heliopause, where this outward pressure is counterbalanced by inward pressure of the interstellar wind in our neck of the galaxy. The interstellar wind outside that boundary is a flow of atoms and other particles blasted from explosions of dying stars. The location of the heliopause varies with the level of solar activity during the Sun's 22-year sunspot cycle and with changes in the interstellar wind, Stone said.

25 YEARS LATER VOYAGER KEEPS PUSHING the SPACE ENVELOPE

by Guy Webster

Some scientists suggest that, on a much longer time scale, the interstellar wind may occasionally press the boundary far enough inward to sway Earth's climate.

"We would really like to evaluate our theoretical models by determining how far it is to the edge of interstellar space," Stone said. Voyager 1 is rushing toward the heliopause at about 1.6 million kilometer (1 million miles) a day. Whether it gets there before about 2020, while it still has adequate electrical power, depends on how far away the heliopause is. Recent estimates are that, depending on that distance, it would take Voyager 1 between seven and 21 years to reach the heliopause.

Voyager 1 has already discovered that the outbound solar wind around it is slowing from effects of inbound interstellar particles leaking through the boundary. A much better prediction of the boundary's location will come when the spacecraft encounters the termination shock, the zone where the solar wind begins piling up against the heliopause. That encounter may come within the next three years, Stone estimates.

Whatever their future holds, Voyager 1 and Voyager 2 have already earned a prominent place in the history of exploration. Among their big surprises: Jupiter's moon Io has active volcanoes. Jupiter's atmosphere has dozens of huge storms. Saturn's rings have kinks and spoke-like features. The hazy atmosphere of Saturn's moon Titan extends far above the surface. Miranda, a small moon of Uranus, has a jumble of old and new surfac-

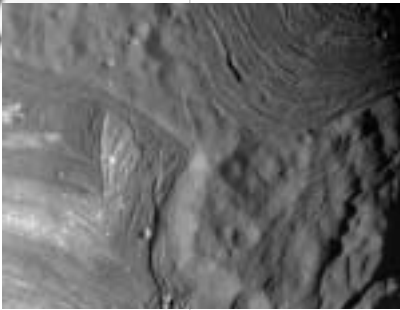
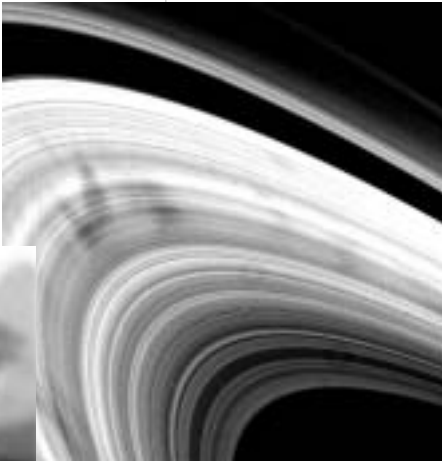
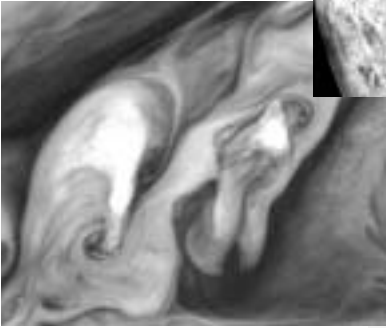
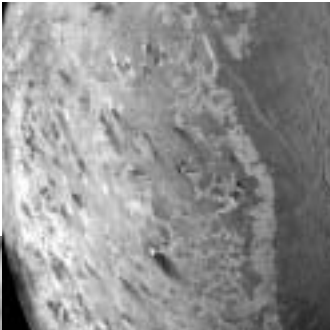
ing. Neptune has the fastest winds of any planet. Neptune's moon Triton has active geysers.

"Voyager has become the icon of exploration," Stone said. "It saw more new worlds for the first time than any mission ever has, and probably ever will. It was an incredible journey of discovery."

That the discoveries turned out to be so surprising only added to the fun.

"It's very hard to break out of preconceptions. Time after time, no matter what we thought we knew, nature tricked us," Stone said. "One thing that made it so exciting was the fact that it could have been very boring. All those moons could have been ancient, heavily cratered objects, but they aren't. We found that nature was incredibly inventive in the way it used the basic laws of nature to create all of these diverse, distinct worlds."

Long after they fall silent, the Voyager twins will keep speeding away from our solar system, each carrying an "interstellar outreach program" of recorded sounds and images from Earth. Further information about Voyager's past discoveries, current interstellar mission and messages from Earth is available at <http://voyager.jpl.nasa.gov> .



Clockwise from the top: Triton's south polar terrain; Saturn's rings with 'spoke' features in B-ring; unusual "Chevron" figure seen on approach to Miranda; Voyager team with Dr. Stone, center of picture; area left of red spot on Jupiter.

Activities to Celebrate Voyager

Sept. 3: 11:30 a.m. – 1 p.m.
Music on the Mall

Sept. 4: 11:30 am – 1:00 pm
Voyager Movie
Von Kármán Auditorium

Anniversary Cake

Sept. 5
Voyager Panel Discussion
Von Kármán Auditorium

Pre-launch, Launch and Encounter Project Managers, Operations Manager, Navigation Team Chief and Experiment Reps. tell of mission facts, mishaps, success, and experiences with light hearted anecdotes.

Sept. 5 and 6: 7 p.m.
"Voyager's Exploration of the Solar System," presented by Dr. Ed Stone, project scientist, and David Morrisroe, Caltech physics professor — von Kármán Lecture Series.

Passings

CHARLES (Chuck) K. WITHAM, 33, member of the engineering staff in the Power and Precision Conversion Systems and Technology Section 346, died Aug. 6 of injuries from a bicycle accident near the East Gate.

Witham received both his Master's (in 1995) and Ph.D. (in 2000) in materials science from Caltech. His work at Caltech



resulted in three U.S. patents and he authored or co-authored 26 publications in the scientific literature.

He then joined the Lab as a post-doctoral research associate and became a Member of the Engineering Staff in January 2001. He was a key member of the Section's fuel cell team.

At Caltech, Witham was an avid cyclist and environmentalist. As a member of the Caltech Environmental Task Force he helped organize a computer-recycling program in conjunction with the Caltech Y; helped reduce paper usage by promoting e-mailed campus announcements; promoted xeriscaping; organized Earth Day fairs; and campaigned for the installation of more campus bicycle racks.

He is survived by his sister, Nita-Lyn Roth of Fort Lauderdale, Fla.; his mother, Linda Witham ofventura, Fla.; his father, Charles M. Witham, New Jersey; a grandmother, Anita Berzin of Ventura; and an uncle, Barry Berzin, Miami. A memorial service was held at his Pasadena home on Aug. 10.

Donations may be made to organizations he supported such as the Los Angeles County Bicycle Coalition or Tree People, which will group donations together into a "grove" in his name.

JAMES MOONEY, 88, a retired administrative group supervisor in Section 662, died July 21.

Mooney worked at JPL from 1955-77. He is survived by his wife, Rosemarie, and son Jack. Services were private.

ZVI SHIPPONY, 54, an atmospheric scientist in Section 3284, died of cancer July 25.

Shippony had worked at the Lab since 1989. He is survived by his wife, Ilana, son Elan and daughter Tamar.

Services were private.

Letters

On behalf of my dad and my self, I would like to thank everyone for their condolences after the passing of my mom. Thanks also to the JPL Store for the beautiful plant. Thank you all

Chris Tippet
Virgil Tippet



Classified ads will be available the day before Universe is published, at <http://dailyplanet>

JPL's online news source

View this and previous issues of Universe online

<http://universe.jpl.nasa.gov>

Universe

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Notice to Advertisers

Advertising is available for JPL and Caltech employees, contractors and retirees and their families. No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission. Ads must be submitted on ad cards, available at the JPL Store and the Universe office, Bldg. 186-118, or via e-mail to universe@jpl.nasa.gov.

Ads are due at 2 p.m. on the Monday after publication for the following issue.

All housing and vehicle advertisements require that the qualifying person(s) placing the ad be listed as an owner on the ownership documents.

Classifieds

For Sale

BABY ITEMS: soft front carrier, Evenflo, \$7; car seat w/base, Century, rear-facing, \$40; bathtub carousel, Safety1st, \$7; all in superb cond., prices are obo. 626/791-6101. BABY SWING, Graco, 3 speed, battery operated, blue/green plaid, good cond., \$25. 626/256-6606. BACKPACK, GVP gear G4, forest green, brand new never used, \$55. 626/398-3649. BASEBALL CARDS, Topps 1986 Traded series, box of 100/132 ct., unopened, Barry Bonds included, \$50. 805/967-7725. BED, Trundle, dark wood exterior, great addition to any kid's room, 1 mattress avail., \$50/obo. 831-3998. BED, antique oak & rod iron, queen size w/rails, \$80; SKI SET, used women's Head 170s GALA, radial & poles, Salomon boots, size 7 & bindings, see pictures @ JPL Store, \$80. 626/744-9064.

BIKE SEAT, child's, Rhode Limo, good cond., includes rear rack, \$50; CHILD

CARRIER, Kely-Kids Country model, good cond. \$50; MTN BIKE, Diamondback Apex 1991 model, dark green, 21-speed, large (20") frame, \$50. 626/794-8720, Andy or Lisa.

BREAST PUMP, Medela Pump In Style Breast Pump, complete with all parts & accessories, good cond., \$150. 626/256-6606.

CELLULAR PHONE, SprintPCS, model TP2200, dual-band, charger, manual, 10 months old, \$80/obo. 626/644-7361, day or 626/345-0413, eve.

CHANDELIER, southwestern style, \$50; SKILSAW, 3400 10" table saw, good cond., \$50; MATTRESS, queen, good cond., \$30; WINE RACK, small, wooden \$5;

TORCHIERE, halogen, brown, ~6 ft. high, \$5. 626/794-8720, Andy or Lisa.

CHRISTMAS TREE, white with lights, 6.5 ft. tall. 998-5712, after 6 p.m.

COFFEE MAKERS: Krups, 10-cups, white/gray, like new, \$40/obo; Braun, 10-cups, white/black, like new, \$30/obo. 626/791-6101.

COLLECTOR PLATES, in individual boxes, sold as a set or individually, \$75.

626/359-7666.

COMPUTER MONITOR, 21 in., .25 dpi, ViewSonic P810, Mac/PC, in original box, \$350/obo; KVM SWITCH, 2 port, USB, for control of 2 computers using 1 keyboard/monitor, Mac/PC, \$75. 790-7129, Bill.

DOG HOUSES, beds and other supplies. 998-5712, after 6 p.m.

ESTATE SALE: bedroom set, very nice, queen size, fruit wood, double dresser mirror, 2 bedside tables, exc. cond., \$300; recliner, well-built, brown, leather-like, \$50; desk chair, tapestry seat, wood, good cond., \$25; air cleaner, Hepa, \$70; TV, old, color, 19", \$15; tables, lamps, misc., no calls until 8/18. 626/355-6923.

LOVE SEAT, with convertible bed, good cond., white, \$195/obo. 323/256-0535.

MATTRESS, queen size, Sealy Posturepedic, 3.5 yrs old, \$75. 626/395-8659.

MOVING SALE: entertainment center, 3 piece, light oak, \$785; dining table with 6 matching chairs, \$495; sofa and loveseat, \$680; stereo system, \$99; TV, RCA, 32 inch, \$435; coffee table, \$235;VCR, \$35; computer chair, \$80; CD case, \$15; 909/971-9604

OVEN, Kitchenaid, self-cleaning, electric, \$50; STOVETOP, Décor, 5 burner, gas, \$50. 790-2915.

PICNIC TABLE, redwood, 42 in. round w/4 benches, needs refinishing, \$40.

626/447-7584.

PORTABLE COMPUTING SYSTEM, HP 75C, w/manuals, accessories and cables, extras include leather carrying case, ac adapter and overlay set, HP82162A thermal printer comes with manual, ac adapter, cables, 9 rolls paper, in orig. box, exc. cond. 661/274-8446.

SCANNER, brand new, Visioneer OneTouch 5800 USB 48-bit color, 600 x 1200 dpi, supports Windows 98/2000/Millennium/XP, \$40. 956-3745, Steve.

SERVER RESOURCE KIT, Microsoft Windows 2000, 8 volume set, new, shrink wrapped, \$130; Exchange 2000 resource kit also available, \$30. tcfs@aprelix.com.

SOFA and LOVE SEAT, Broyhill, camel back, green, great cond., \$500/obo. 626/319-7234, lv. msg.

SOFA SLEEPER, makes into queen bed, abstract black, blue and mauve design, good

cond., \$300; BICYCLES, 4, children's, need TLC, \$15/ea.; LADDER, metal, \$50. 626/357-8210.

TABLE SAW, Black & Decker, 8", with owner's manual and book, \$135. 323/256-0535.

TYPEWRITERS, 3, two Royal portables (circa early 40s), one Underwood (circa 1938), all three \$100. 848-0904.

VIDEO, Disney "Aladdin & the King of Thieves" VHS, new, sealed, \$17; OTHER DISNEY VIDEOS, brand new, also available. 562/420-2313.

VIOLINS, 2, inherited, owned by professional violinist, ea. appraised at \$1,500, will consider offers. 626/794-1716.

WASHER/DRYER combo, super efficient and quiet European design saves water, electricity, front loading, washes then dries in same unit, does not need to be vented, perfect size for apartment or closet, see <http://www.specializedappliances.com/index.htm> for product photos and info, exc. cond., used 1 yr. \$400. 323/223-7652.

Vehicles/Accessories

'94 BAYLINER Trophy 20' power boat, 150hp Mercury outboard, trailer, cuddy cabin, porta potti, 2 fish wells, live well, depth finder, marine radio, stereo/cassette player, auxiliary motor mount, vg cond., motor recently serviced, \$12,000/obo. 248-7331, eves.

'00 BMW Roadster convertible, 2.8 liter engine, 5-spd., silver w/black top, custom red/black leather interior, premium sound system with Karman speakers, dealer-installed alarm system, dealer-maintained, just warmed up at 36,000 miles, reduced to \$27,500. 323/533-2490.

'95 CHEVROLET Camaro, sliver, t-tops, V6, 5 spd. manual, 80K mi., exc. cond., \$8,000. 352-2380.

'93 CHEVROLET pick-up, 1/4 ton, teal green, 2-dr., extended cab, short bed, Duratrunk and liner, towing and 5th wheel ready, good cond., 70,000 mi., \$9,000. 661/297-8544.

'81 CHEVROLET Corvette coupe, silver over charcoal/black interior, glass tops, rare 4-spd, a/c, par. brakes/windows/door locks/steering, 6-way pwr., driver's seat, alloy wheels \$4,200. 661/299-4999.

'95 EAGLE Summit Wagon, (twin of Mitsubishi Expo), 85K, SUV space w/car-like ride, efficiency, auto, all power, a/c, good mileage, clean, needs trans. work, \$1,750/obo. 661/424-1420.

'94 DODGE Stealth, exc. cond., 92,000 mi., black interior, \$7,500. 909/989-7563.

'01 FORD Escape XLT, 4 x 4, 3.0 L, V6, all options except side step bar, mocha int./ext., 27K mi., exc. cond., 2 new tires, \$19,500/obo. 626/584-3841.

'98 FORD Mustang Cobra, 52,000 mi., engine is all aluminum, dual overhead cam, 32 valve, 305 HP v8, 5 spd., manual transmission, black exterior, tan interior, comprehensive extended warranty. \$19,500/obo. 434-0425, Greg.

'98 FORD Ranger XLT, great cond., wht., 2 dr., V6, 4.0, 83k mi, 6" body lift, off road tires, custom brush guard, pwr. everything, A/C, ABS, AM/FM/cass., bedliner, tow hitch, spotlight, email code3media@crownvinc.net for link to photos, \$11,000/obo. 822-6465.

'91 FORD Taurus, white, 4 dr., fully loaded, A/C, cassette, needs body work on bumper only, runs great, 168K mi., \$1,750/obo. 805/583-5129, Jill.

'89 FORD Bronco XLT, full-size, 4 X 4, 5.8L, V8, auto, a/c, ps/pb, roof rack, am/fm/CD \$3,200/obo. 661/254-8012.

'87 FORD F-250 PU, 460cid, V8, 4:10-1 diff. auto, A/C, AM/FM, PS/PB, cruise, new tires, 5th wheel hitch/bed cover, 43K mi., good cond., strong tow veh., records available, renewed lic.-Jan. cab top air foil, smog test, \$4,600/obo. 626/963-5727.

'87 FORD F150, V8, 5.0, a/c, power everything, auto., cruise control, _ cab & long bedliner, tow ball, HD springs, good cond., \$3,000/obo. 951-3653.

'83 FORD 250 XLT, diesel with camper shell, good cond., \$1,200/obo. 626/577-2882.

'94 HONDA Nighthawk, 250cc, 2500 miles, exc. cond., kept in garage, \$1,500. 562/693-1136.

'91 HONDA Civic DX, 5 spd. man., air, AM/FM stereo/cassette, org. paint/int., new tires, new catalytic converter, \$4,000/obo. 213/229-2980, Hunaid.

'89 HONDA Accord LXi hatchback coupe, gray with wine interior, a/c, pwr. windows/ mirrors, AM/FM/cassette stereo, good commuter, 35 mpg hwy., \$2,000. 661/299-4999.

'85 KOUNTRY Lite 5th wheel trailer, 30 ft.,

orig. owner, alum. frame, 13.5K mi., A/C, side bath, microwave, TV/VCP avail, new tires & water pump, sleeps 6., exc. cond., renewed lic.-Mar., \$7,200/obo. 626/963-5727.

'91 NISSAN Infiniti G-20, fair cond., \$2,600/obo. 957-3675.

'98 TOYOTA Camry LE, exc. cond., automatic, a/c, power locks/windows, AM/FM/cassette, sage, 12 mo. of warranty remaining, 64,000 mi., Blue Book \$13,000/obo. 626/797-6388.

'96 TOYOTA Corolla DX, 4 dr., 5 spd., dual air bags, A/C, AM/FM, cassette, CD, all power, tilt wheel, new tires, exc. cond., 137K mi., \$5,600/obo. 760/246-3825.

'96 TOYOTA Corolla DX, 28K mi., pwr. windows, pwr. locks, spoiler, exc. cond., \$5,500. 909/599-3230.

'88 TOYOTA Corolla, 4 dr., white, new tires, a/c, battery, beautiful cond., \$2,800/obo. 626/379-3503.

'86 TOYOTA Celica GT, new paint, sunroof, must sell, \$2,300. 626/379-3503.

'01 VOLKSWAGEN Beetle GLS, silver/black leatherette, 5 spd., pwr. locks, windows, & mirrors, cruise, alloys, AM/FM cass, CD changer, fog lights, ABS, remote keyless entry, 8K mi., \$16,800. 626/449-0997.

'87 VOLKSWAGEN Syncro Vanagon, 4 WD, 5 spd., white, A/C, am/fm/cass., 130K mi., very good cond., \$4,500. 687-3915 or 790-8702, eve.

'97 YAMAHA Virago motorcycle, black with saddle bags, 5,100 miles, exc. cond., \$5,000/obo. 805/338-1942, John.

Wanted

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present. 790-8523, Marc Rayman.

COMPUTER, laptop at a reasonable price. 626/379-7288, Jasmine.

GUEST HOUSE, in La Canada, excellent references. 951-7305.

ROOM, (bedroom) for \$400 a month including utilities, will use it from 2 - 4 nights/week, no Fri., Sat., Sun. or holidays. 535-1286, Charlie.

TAPE RECORDER, reel-to-reel audio, in working condition, should play audiotape reels up to 7 inch in diameter. shugars@juno.com

TILE SAW, wet, 7 or 10 inch diamond blade, good cond. or better only, must be complete. 661/297-0219.

VOLLEYBALL PLAYERS, coed, no beginners please, every Tuesday night from 8 to 10 at Eagle Rock High School, \$3 per night. 956-1744, Barbara.

Free

BABY FOOD JARS, glass, great for crafts. 562/420-2313.

BICYCLE, boy's 19" Nishiki Olympic, needs new tires. 952-0474, eves.

PRINTER, Apple Imagewriter dot matrix, ribbons, manual, tractor feed paper, good for banners. 952-0474, eves.

Lost & Found

Lost: FLOWER ARRANGEMENT, "purple iris", silk, from Bldg. 111, Room 150" P", please return, great sentimental value. 4-3500.

For Rent

ALTADENA, condo, minutes from JPL, 2 bd., 1.75 ba., nice closets with organizers, fireplace, central A/C & heat, community pool, storage room, and two car garage (carport), tile counter top and marble floor in kitchen, large patio with landscape, planters and oriental garden with waterfall and spa, end unit with windows on three sides, cable on, \$1,200. 626/398-1988.

PASADENA, guest house, above Eaton Canyon golf course, in a beautiful setting, about 1,000 sq. ft., washer & dryer, ideal for one person with a very quiet lifestyle, \$895 plus utilities. 626/798-4056.

PASADENA, apt. to share, 2 + 2 + loft, in luxury security complex near Colorado and Lake, living room, loft and kitchen fully furnished, DSL/balcony/pool/Jacuzzi/gym, \$750/month. 626/644-5431.

PASADENA, fully furnished, town home-style apartment, 2 bd., 1.5 ba., with A/C, new carpet and flooring, small patio, laundry facility and parking, \$1,250 plus utilities; 2 bd.,

PASADENA, 1.5 ba., apt. to share with student, furnished, A/C, laundry facility, parking, \$625 plus utilities, both are close to Caltech, & PCC, 7 mi. to JPL. 626/351-9641.

PASADENA, large condo in centrally located complex, 2 bd., 2 ba., office, separate kitchen, 1 mile from Caltech, furnsh., \$2,500,

1-yr. lease, available 9/1 626/793-1473.

PASADENA, charming guest house, near Caltech, 1 bd., 1 ba., formal dining room, ornamental fireplace, includes stove and fridge, wall A/C and ceiling fans, laundry room with washer/dryer hookups plus storage room, no pets, \$1,050. 626/844-6425.

PASADENA, spacious 2 story condo, 3 bd., 2.5 ba., prestigious community, beaut. inter., bright ktch., prof. landscape, ctrl. air & heat, close to shop., cozy l/r w/FP, end unit, frml. d/r, hdwd. flrs., immac. cond., close to schls, \$1,750. 626/396-9024.

SAN MARINO, house, 3 bd., 2 ba., 2-car garage with automatic garage opener, newly painted, remodeled kitchen, dishwasher, a/c, laundry hookups, spacious family room overlooking yard, living room with fireplace, close to bus, excellent neighborhood and school district, \$2,690. 626/576-7333.

SHADOW HILLS, 3 bd., 2 ba., horse ranch, 1,400 sq. ft. on 5.5 acres, fireplace, view, balcony, pets ok, 13 mi. to JPL, avail. 8/26 \$1,595. 626/584-6526, Fred.

SIERRA MADRE, townhouse style apt to share, large patio, 12 x 12 foot bedroom, quiet tree-lined street, garage parking, no smoking, \$650 + 1/2 util. 626/355-4838.

SUNLAND, Sunland Village condo, 15 mins./JPL, 2 bd., 1.5 ba., washer & dryer, fireplace, balcony, refrig., stove/oven, dishwasher, garbage disposal, attached oversized double garage with ample storage, 2 pools, Jacuzzi, tennis court, 210 freeway & shopping close by, many JPLers live here for car pooling, \$1,100. 951-3653 or 352-0786.

Real Estate

PASADENA, Rose Bowl area, 1910 Craftsman/Victorian transitional, 5 bd., 2 ba., large attics, Cal. basement, dual zone, a/c, large kitchen, many built-ins, fully restored, \$585K. 626/584-3841.

SILVERLAKES, Calif., resort, golfer's dream, 4 weeks free golf anytime each year, vacation club membership, 2 bd. condo for up to 6 people, two lakes, many amenities, private PGA rated course with driving range and putting greens, less than 2 hours from Pasadena, exchange rights with 3,000 resorts, reduced to sell due to illness, \$15,000. 805/967-7725.

Vacation Rentals

BALBOA ISLAND, fully furnished, 2 bd., 1 ba., sleeps 4, dishwasher, microwave, TV, covered patio, parking, laundry facilities, steps to bay, quiet location, available weekly during the summer, \$1200-\$1500/week. 626/351-9641.

BIG BEAR LAKEFRONT, luxury town home, 2 decks, tennis, pool/spa, beautiful master bd. suite, sleeps 6. 949/786-6548.

CABO SAN LUCAS, on the beach, two pools, gym, tennis, volleyball, beach grill, short walk to town, one bedroom and sleeper couch, sleeps 4, full kitchen, air conditioning, \$750/week. tcfs@aprelix.com.

CAMBRIA, ocean front house, sleeps up to 4, exc. view. 248-8853.

HAWAII, Kona, ocean front on Keauhou Bay, house and guest house comfortably sleep 6, 3 bd., 2 ba., rustic, relaxing and beautiful, swimming, snorkeling, fishing, spectacular view, near restaurants, golf and other attractions. 626/584-9632.

HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn. phone, color TV, VCR, microwave, d/w, pool, priv. lanai, slps 4, laundry fac., 4/15-12/14 \$105/nite/2, 12/15-4/14 \$120/nite/2, \$15/nite/add'l person. 949-348-8047, e-mail jackandrandy@cox.net.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, sleeps 6-8, fully equipped kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/view to mtns., Jacuzzi, sauna, streams, fishponds, close to Mammoth Creek, JPL discount. 626/798-9222 or 626/794-0455.

OCEANSIDE, on the sand, charming 1 bd. condo, panoramic view, walk to pier & harbor, pool/spa, game rm., sleeps 4. 949/786-6548.

OCEANSIDE condo, fully furnished, 2 bd., 2 ba., fireplace, full kitchen, quiet, relaxing, in beautiful setting, located at beachside, with barbecue, pool, spa, game room, and great ocean view, easy walk to pier and restaurants, sleeps 8, available weekly or monthly. 909/981-7492 or dhaunge@yahoo.com, Darlene.

ROSARITO BEACH condo, 2 bd., 2 ba., ocean view, pool, tennis, short walk to beach, on priv. rd., 18-hole golf course 6 mi. away, priv. secure parking. 626/794-3906.